

11. REMARKS ON ALL THE HUMAN ENTOZOA. BY T. SPENCER COBBOLD, M.D., F.L.S., LECTURER ON COMPARATIVE ANATOMY, ZOOLOGY, AND BOTANY AT THE MIDDLESEX HOSPITAL.

At the recent Cambridge Meeting of the British Association for the Advancement of Science, I adduced the following argument in favour of a more extended prosecution of experimental research in the department of human helminthology :—"As man is infested by a great variety of internal parasites, and some of them prove exceedingly troublesome, it is evident that a large amount of practical good would ensue if we were more perfectly informed respecting the origin and economy of these creatures; for not only are our personal interests directly affected by their intrusion, but we also suffer indirectly from the injury and destruction they occasion amongst our domesticated animals. At least thirty well-marked forms have been described as infesting the human body; and although most of the species are comparatively rare, yet a considerable number are exceedingly common in occurrence, and likewise often prove numerically abundant in one and the same individual."

This argument was supported by a reference to certain recently ascertained facts, a more particular account of which, combined with the results of my own inquiries, I now submit to the consideration of the Zoological Society.

In the subjoined list I only record those which are perfectly distinct forms, and therefore probably good species. Many forms which were at first supposed to be distinct will be found in the synonymy placed at the head of each comment where the species is separately considered. The larvæ are noticed under the titles of the adults to which they are either known or presumed to be respectively referable. This method is followed even in cases where the adult condition is not known to occur in the human body or in any other "host:" thus, for example, the *Cysticercus acanthotriax* is placed under *Tenia acanthotriax*, although the mature tapeworm at present remains unknown :—

*Human Entozoa.*

1. *Fasciola hepatica*, Linnæus.
2. *Distoma crassum*, Busk.
3. — *lanceolatum*, Mehlis.
4. — *ophthalmobium*, Diesing.
5. — *heterophyes*, Siebold.
6. *Bilharzia hæmatobia*, Cobbold.
7. *Tetrastoma renale*, Delle Chiaje.
8. *Hexathyridium pingvicola*, Treutler.
9. — *venarum*, Treutler.
10. *Ascaris lumbricoides*, Linnæus.
11. — *mystax*, Rudolphi.
12. *Trichocephalus dispar*, Rudolphi.
13. *Trichina spiralis*, Owen.
14. *Filaria medinensis*, Gmelin.

15. *Filaria lentis*, Diesing.
16. *Strongylus bronchialis*, Cobbold.
17. *Eustrongylus gigas*, Diesing.
18. *Sclerostoma duodenale*, Cobbold.
19. *Spiroptera hominis*, Rudolphi.
20. *Oxyuris vermicularis*, Bremser.
21. *Tænia solium*, Linnæus.
22. ——— *mediocanellata*, Küchenmeister.
23. ——— *acanthotriasis*, Weinland.
24. ——— *flavopuncta*, Weinland.
25. ——— *marginata*, Batsch.
26. ——— *echinococcus*, Siebold.
27. ——— *nana*, Siebold.
28. ——— *elliptica*, Batsch.
29. *Bothryocephalus latus*, Bremser.
30. ——— *cordatus*, Leuckart.

In this list it will be observed that I have purposely omitted the Acarine genus *Pentastoma*, the Annelid *Dactylius aculeatus* (Curling), and several other internal parasites not strictly referable to the Helminths.

Up to the present hour no one has recorded the occurrence of any acanthocephalous helminth within the human body, although it is well known that *Echinorhynchi* have been found in all the vertebrate classes, and even in the *Simiadeæ*\*.

#### 1. FASCIOLA HEPATICA, Linnæus.

*F. hepatica*, Linnæus, Pallas, Fabricius, Müller, Fröhlich, Bose, Blanchard, Cobbold, &c.

*F. humana*, Gmelin.

*Distoma hepaticum*, Abildgaard, Zeder, Mehlis, Rudolphi, Bremser, Delle Chiaje, Dujardin, Creplin, Siebold, Owen, Pluskal, Küchenmeister, Diesing, Weinland, Simonds, &c.

*Planaria latiuscula*, Goeze.

The general structure of this parasite is now thoroughly well understood, although some minor points, more especially in respect of the mode of origin of the branches of the water-vascular system, remain to be investigated. The old view of Mehlis, as to the termination of the excretory system by an open *foramen caudale*, although

\* In connexion with this subject I may remark that I have just received (Nov. 1st) a most interesting brochure from Prof. Rudolf Leuckart, in which he describes a remarkable series of genetic changes discovered by him as occurring in *Echinorhynchus proteus*. Contrary to our previous notions, he proves by experiments (with eggs administered to the *Gammarus pulex* of our ponds and rivers) that the embryos materially differ from the adult forms, and stand in the same relation to them that the larval *Pluteus* and *Pilidium* respectively do to *Ophiurus* and *Nemertes*. An alternation of generations was certainly quite unsuspected. The title of the paper is "Helminthologische Experimentaluntersuchungen," having been communicated to the Göttingen königliche Gesellschaft der Wissenschaften on the 9th October, 1862. Prof. Busk has since given a translation of this paper in the 'Microsc. Journal' for January 1863.

rejected by Blanchard, is now generally accepted as correct. In other particulars, concerning the mode of distribution of the aquiferous vessels, the representations of the French naturalist appear to be trustworthy, and my own injections confirm his statements in all essential points\*. Up to the present hour a complete history of the development of this species has not been made out; but the recent investigations of Van Beneden, Pagenstecher, Wagener, Filippi, and others enable us to form tolerably accurate conclusions respecting the abode and migrations of its larvæ. As, however, I have recently published the results of my investigations on this point in my paper "On the Common Liver Entozoon of Cattle," in the pages of the 'Intellectual Observer' (vol. i. p. 115 *et seq.*), I need not now recapitulate the deductions there recorded; but I may observe, in passing, that a well-sustained series of researches are still wanting to complete the chain of evidence†. The costly nature of these investigations has alone prevented my further prosecution of the necessary experiments. Hitherto, only nine instances have been recorded of the occurrence of this parasite within the human body; and for particulars respecting these I may also be permitted to refer to my "Synopsis of the Distomidæ," in the fifth volume of the Journal of the Proceedings of the Linnean Society.

## 2. DISTOMA CRASSUM, Busk.

*D. crassum*, Cobbold, Simonds.

*D. buskii*, Lankester, Moquin-Tandon.

*Dicrocoelium buskii*, Weinland.

This is a good species, and appropriately named; for, although Von Siebold (in Müller's Archiv for 1836, p. 234, and in his Lehrbuch, vol. i. p. 143) refers to a Distome infesting *Hirundo urbica* under this title, he has given no description of the worm. Dising places Von Siebold's *D. crassum* among his *species inquirendæ*, and it is very probably identical with the *D. maculosum* of Rudolphi. No other instance has occurred since the original fourteen specimens were discovered by Mr. Busk in the duodenum of a Lascar. From a careful examination of three examples, severally presented by the discoverer to the Museum of the Royal College of Surgeons, the Museum of the Middlesex Hospital Medical College, and to my private collection‡, I am satisfied that it is generically distinct from the above; but it is unnecessary to insist further on this distinction, as

\* Specimens of the *Fasciola gigantea*, thus prepared, were exhibited by me at the Glasgow Meeting of the British Association in 1855, a description of them being given in the 'Report,' Sect., p. 108; and a more extended account of the same appeared in 'Edin. New Phil. Journ.' for 1855, plate 7.

† Since the above was written, I have received a communication from Professor Leuckart, of Giessen, in which he mentions that he has at last succeeded in solving many points respecting the phases of development through which this species passes. A full account of these changes will doubtless appear in the second division of his valuable work (Die menschlichen Parasiten) now in course of publication.

‡ I have forwarded this specimen to Prof. Leuckart in exchange for other rare parasites.—T. S. C., Jan. 10, 1863.

I have elsewhere fully exposed the fallacy of combining the genera *Fasciola* and *Distoma*. In two of the specimens which Mr. Busk injected with mercury, the injection has passed from the digestive into the aquiferous system, which latter, in its arrangements, does not differ materially from that of *Fasciola hepatica*. The original account in Dr. Budd's valuable work on Diseases of the Liver speaks of a "branched uterine tube;" but this description is manifestly erroneous, and probably refers to the division of the upper end of the vitelligene tube into the ducts which come from the yolk-forming glands on either side of the body.

### 3. DISTOMA LANCEOLATUM, Mehlis.

*D. lanceolatum*, Mehlis, Bucholz, Gurlt, Valentin, Chabert, Dujardin, Diesing, Blanchard, Baird, Küchenmeister, Leidy, Moulinié, Cobbold, &c.

*D. hepaticum*, Zeder, Rudolphi, Bremser, Olfers, Bojanus, Creplin, Gurlt, Owen.

*D. conus*, Gurlt.

*Fasciola hepatica*, Bloch, Jördens, Bosc.

*F. lanceolata*, Rudolphi, Moquin-Tandon.

*Planaria latiuscula*, Goeze.

*Dicrocoelium lanceolatum*, Weinland.

Only two instances of the occurrence of this well-marked form in the human subject are recorded, one by Bucholz, the other by Mehlis and Chabert. The latter occurred in France, in a girl twelve years of age, from whom Chabert expelled a large number of specimens by the employment of empyreumatic oil. The specimens found by Bucholz in the body of a prisoner who died from fever are, it is believed, still preserved in the Museum of the University of Jena. Mehlis was the first to establish clearly the non-identity of this species with the common fluke,—a view which was shared also by Schäffer and Rudolphi, but subsequently abandoned by the latter. Its structure has been well investigated by Valentin, Blanchard, Walter, and Küchenmeister, from examples occurring in the gall-bladder and biliary-ducts of our domesticated ruminants.

### 4. DISTOMA OPHTHALMOBIUM, Diesing.

*D. ophthalmobium*, Diesing, Küchenmeister, Cobbold, Moquin-Tandon.

*D. oculi-humani*, Gescheidt.

? *D. (lentis)*, Von Ammon.

*Dicrocoelium oculi-humani*, Weinland.

? *Monostoma lentis*, Nordmann, Gescheidt, Diesing, Küchenmeister, Cobbold, Weinland.

? *Festucaria lentis*, Moquin-Tandon.

Gescheidt found four specimens in the eye of a child five months old, born with lenticular cataract. No one of them exceeded half a line in length; and they were situated between the lens and its capsule, where they could be recognized as so many dark spots on the

surface of the lens. From the original description in Von Ammon's 'Zeitschrift für Ophthalmologie' we are scarcely warranted in concluding that the specimens were sexually mature. The author speaks of ovaries, but they were "indistinct," and they are not represented in the carefully executed figures given in Von Ammon's writings ('Klinische Darstellungen der Krankheiten des menschlichen Auges,' vol. i. t. 12, and vol. iii. t. 14). I think it likely that Von Nordmann's *Monostoma lentis* is identical with this worm; and I perceive that Dr. Weinland, of Frankfort, entertains a similar suspicion. Küchenmeister's idea that this *Monostoma* may be a young *Cysticercus cellulosæ* is not at all convincing; for no one ever heard of eight *Cysticerci* occupying one eyeball, and much less is it likely that they should occur thus gregariously in the human lens. Trematodes are seldom solitary; and all the circumstances render it probable that the worms extracted by Prof. Jüngken, in his case of cataract, were specifically identical with those removed after death from the eye of the little girl who died from infantile atrophy whilst under Von Ammon's care.

#### 5. *DISTOMA HETEROPHYES*, Siebold.

*D. heterophyes*, Siebold & Bilharz, Küchenmeister, Diesing, Leuckart, Cobbold.

*Fasciola heterophyes*, Moquin-Tandon.

*Dicrocoelium heterophyes*, Weinland.

In the month of April 1851, Dr. Bilharz, of Cairo, discovered this minute worm in the small intestine of a boy; and on a second occasion he collected several hundred specimens under very similar circumstances. The parts infested displayed a multitude of reddish points, due to the presence of the dark-coloured ova seen in the interior of the worms. The length of the largest specimens did not exceed three-fourths of a line. Their anatomy is fully described by Siebold in the fourth volume of the 'Zeitschrift für wissensch. Zool.,' and also by Küchenmeister in his 'Manual.'

#### 6. *BILHARZIA HÆMATOBIA*, Cobbold.

*Bilharzia hæmatobia*, Cobbold.

*Gynæcophorus hæmatobius*, Diesing.

*Thecosoma hæmatobium*, Moquin-Tandon.

*Distoma hæmatobium*, Bilharz, Küchenmeister, Moulinié.

*Schistosoma hæmatobium*, Weinland.

Most helminthologists agree as to the propriety of placing this remarkable trematode in a separate genus, but some dispute has arisen concerning the priority of the various titles which have been proposed. The generic name here adopted is one which I applied to a second species discovered by me six months before Diesing communicated his "Revision der Myzelminthen" to the Vienna Academy; but I shall have no objection to employ the title *Gynæcophorus*, proposed by him, if it be generally thought more appropriate. Weinland has expressed to me his willingness to abandon the title

*Schistosoma* in favour of *Bilharzia*, which he admits has the priority. Though it is of little consequence which name be retained, the genus itself is one of remarkable interest, not merely in a structural point of view, but also from its prevalence on the borders of the Nile. The first specimens were discovered by Dr. Bilharz, of Cairo, in the portal system of blood-vessels; and others were subsequently observed by him, Griesenger, Reinhard, and Lautner in the veins of the mesentery, bladder, and other parts, giving rise to a formidable and very prevalent disease. The anatomy of *Bilharzia* has been fully described by the original discoverer and by Küchenmeister; but I would observe, in passing, that it is rather singular that Moquintandon should express his belief that the sexes have been mistaken by such competent authorities. The circumstance of the smaller form being carefully described by them as furnished with uterine ducts containing eggs ought to leave no doubt in our minds as to the correctness of the generally received opinion, unless we have distinct evidence to the contrary. In connexion with this subject I would also again call attention to the circumstance of my having discovered the second species of *Bilharzia* (*B. magna*) in the portal system of an African Monkey (*Cercopithecus fuliginosus*). Those who pay regard to the distribution or limitation of particular forms will see in this fact a curious illustration of the affinities of habit; for there can be little doubt that the Sooty Monkey procures the larvæ of its *Bilharzia* from a source similar to that from which our Egyptian brethren procure the larvæ of *B. hæmatobia*, and it is not a little significant that the genus in question should only at present be known to infest men and monkeys. For further particulars in regard to this parasite I must refer to my previous papers in the 'Linnean Transactions' (vol. xxii. p. 364), 'Linnean Proceedings' (vol. v. Zool. Div. p. 30), 'Zoological Society Proceedings' (1861, p. 118), and in the 'Intellectual Observer' (vol. i. p. 352).

#### 7. TETRASTOMA RENALE, Delle Chiaje.

*T. renale*, Delle Chiaje, Diesing, Dubini, Leidy, Weinland.

The occurrence of this entozoon as a human parasite appears hitherto to have escaped the notice of English zoologists, although discovered by Lucarelli and Delle Chiaje in 1833. All that we now know of it is due to the original description of Chiaje, from whose 'Elmintografia Umana' we learn that it attains a length of 5 lines, has an oval flattened body, and is furnished with four suckers disposed in a quadrate manner at the caudal extremity. The reproductive orifices are situated near the mouth. It infests the tubes of the kidney.

#### 8. HEXATHYRIDIVM PINGUICOLA, Treutler.

*H. pinguicola*, Treutler, Jördens, Brera, Leidy, Weinland.

*Hexastoma pinguicola*, Cuvier.

*Linguatula pinguicola*, Lamarek.

*Polystoma pinguicola*, Zeder, Rudolphi, Bremser, Delle Chiaje, Owen, Dujardin, Dubini.

This species was once found by Dr. Treutler in a diseased ovarium ; and no second instance of its occurrence in Germany or elsewhere has since been recorded. A concise description of this trematode, which attains a length of 8 lines, is given in Prof. Owen's article "Entozoa" in the 'Cyclopedia of Anatomy and Physiology.' It is also figured from Treutler in various works. Van Beneden and Gervais have supposed that this parasite may, after all, have only been the *Pentastoma denticulatum*. This view is inadmissible. (See a footnote by Leuckart, in his monograph of the "Bau und Entwicklungsgeschichte der Pentastomen," p. 11.)

#### 9. HEXATHYRIDIDIUM VENARUM, Treutler.

*H. venarum*, Treutler, Jördens, Rudolphi, Brera, Bremser, Diesing, Leidy, Weinland.

*Hexastoma venarum*, Cuvier.

*Hexacotyle venarum*, Blainville.

*Linguatula venarum*, Lamareck.

*Polystoma sanguicola*, Delle Chiaje, Frick.

*P. venarum*, Zeder, Rudolphi, Dujardin, Owen, Dubini.

This species is better known than the above. Treutler originally obtained two specimens from the blood of the anterior tibial vein of a young man who accidentally ruptured the vessel while bathing at Leipsic. Rudolphi and others sought to throw doubt on Treutler's observation, and referred these worms to the freshwater *Planariæ*. At Naples, however, Delle Chiaje subsequently procured specimens from the sputa of two young persons suffering from hæmoptysis ; and a fourth instance has also been noticed by Follina, where the worm was found in venous blood. This species attains a length of 3 lines, is cylindrico-lanceolate in shape, its six suckers being biserially disposed on the under side of the so-called head.

#### 10. ASCARIS LUMBRICOIDES, Linnæus.

*A. lumbricoides*, Linnæus, Bloch, Göze, Werner, Gmelin, Schrank, Fröhlich, Rudolphi, Jördens, Brera, Otto, Bojanus, Deslongchamps, Bremser, Blainville, Nitzsch, Delle Chiaje, Cloquet, Schmalz, Gurlt, Cuvier, Owen, Creplin, Eschricht, Sortegana, Gluge, Siebold, Dujardin, Pruner, Blanchard, Küchenmeister, Richter, Moquin-Tandon, Weinland, &c. &c.

*Fusaria lumbricoides*, Zeder.

*Lumbricus teres hominis*, Tyson, Redi, Valisneri.

? *Nematodeum hominis (ventriculi)*, Déglard, Leveillé, Clesius.

? *N. hominis (viscerum)*, Pruner, Diesing.

? *Ophiostoma pontierii*, Cloquet, Delle Chiaje, Bremser.

This well-known parasite is by some still considered identical with *Ascaris megalocéphala* of the horse and *A. suilla* of the hog ; but I agree with Dujardin, Moquin-Tandon, Claparède, and others in regarding it as distinct. The anatomy of *Ascaris lumbricoides* has been well illustrated by Cloquet and others ; but the precise manner in which the young gain access to the human body is very imper-

fectly understood. It is well known that quantities of the immature ova are expelled their "host" *per anum*; and I have myself obtained the characteristic eggs from matters ejected by the mouth. Richter's and Davaine's experiments go to prove that, after the ova have escaped passively, they complete their development in open waters; and it would also appear that an interval of six months must elapse (after their expulsion) before the yelk-segmentation and consequent embryonic formation can take place. In Richter's experiment none of the embryos had emerged after the eggs had been in the water for a period of eleven months; and, in the case of *A. marginata* from the dog, Verloren's previous investigations have shown that the young embryos can retain their vitality for more than a year after their worm-like condition has been attained. According to Davaine (*Comptes Rendus*, 1858, p. 1217), the fully developed embryo is cylindrical, its length  $\frac{1}{100}$ th of an inch, the mouth is not furnished with the three characteristic papillæ of the genus, and the tail terminates suddenly in a point.

His experiments also showed that their development *in ovo* was not facilitated by increase of temperature, neither were the mature eggs affected by several days' immersion in the gastric juice of rabbits and dogs. Further researches therefore are required to decide whether the young *Ascarides* eventually gain access to our bodies after the embryos have escaped from the eggs and have undergone a series of active wanderings elsewhere, or whether, as seems more probable, they are not directly transferred from river- and pond-water to the human stomach.

#### 11. ASCARIS MYSTAX, Rudolphi.

*A. mystax*, Rudolphi, Bremser, Gurlt, Dujardin, Bellingham, Diesing, Siebold, Nelson, Allen Thomson, Meissner, Kölliker, Bischoff, Leuckart, Claparède, Cobbold, &c.

*A. felis*, Gmelin, Fröhlich, Rudolphi, J. V. Thomson, Pickells.

*A. teres felis*, Goeze.

*A. cati*, Schrank.

*A. alata*, Bellingham, Dujardin, Diesing.

*Fusaria mystax*, Zeder.

Although no one has hitherto regarded the *Ascaris mystax* as a human parasite, I am satisfied that Bellingham's *Ascaris alata* (about which there has been so much dispute) is neither more nor less than the well-known *A. mystax* of the Cat. But if this be doubted by Continental helminthologists, I invite their attention to evidence which, to any one conversant with the characters of *Ascaris mystax*, cannot fail to satisfy them that this nematode is liable to infest the human body. The first instance in which this parasite has been observed in man is recorded by Dr. Pickells in the 'Transactions of the Association of Fellows and Licentiates of the King and Queen's College of Physicians in Ireland.' The case is reported at length in vol. iv. pp. 189-221, and in vol. v. pp. 171-196, the text being accompanied by figures of a nematode unmistakeably re-



ferable to *Ascaris mystax*. As this volume is not likely to be accessible to foreign writers, I adduce a few of the leading facts, which, if carefully weighed, will, I think, clear up all doubts as to the nature of Bellingham's *A. alata*, and at the same time rescue from oblivion a most interesting helminthological contribution.

Dr. Pickells's patient was a woman, aged twenty-eight years. The first worm came away in April 1822, and on being submitted to a distinguished naturalist, Dr. J. V. Thomson, of Cork, this authority remarked as follows:—"The *Ascaris* resembles most that which is so common an inhabitant of the stomach of the Cat (*Ascaris felis*), but it is rather longer in proportion to its thickness."

After an interval of one year and ten months (*i. e.* in Feb. 1824) several were passed; then again (in November 1825) eleven more; and subsequently (in March 1826) an additional batch of nine were thrown up alive. In all, Dr. William Pickells had "seen about fifty of various sizes." They were generally evacuated alive, and, in a majority of instances, without medicine. "They came away usually in groups of six or more:" and he adds, "I have sometimes found a whole group knit together by the extremities. The common Lumbricus (*Ascaris lumbricoides*) was also eliminated in some instances. One (of the latter) measured upwards of a foot."

Thus much for the first case. The second is almost equally convincing, if a comparison be instituted between the figures given by the authors. Continental writers have only referred to Dr. Bellingham's 'Catalogue of Irish Entozoa' for a description of *Ascaris alata*; but the account there given is very meagre, in fact a mere abstract. In the 'Dublin Medical Press' for 1831, vol. i. p. 104, Bellingham writes as follows:—"The only instance in which I have as yet met with the *Ascaris alata* was on the occasion of my prescribing for a child aged about five years, who exhibited symptoms of worms. I ordered some vermifuge medicine, and desired, in case any worms were voided, that they should be kept. A day or two afterwards the specimens from which I have taken the above description [given in his paper.—T. S. C.], and which had been expelled by the medicine, were brought to me; they were dead when I received them, and I could not learn that the child ever passed any since."

Dr. Bellingham then refers to Dr. J. V. Thomson's opinion as to the species of nematode in the case under Dr. Pickells's care, and himself admits that the latter worm was "one closely resembling his *Ascaris alata*." He concludes by stating that this *A. alata* "in general appearance is not unlike *Ascaris mystax*, which inhabits the stomach and intestines of the Cat; it differs, however, in having a greater diameter posteriorly than anteriorly, and in the lateral membranes of the head being broader in *A. mystax* than they are in the species under consideration."

I will not now enter further into this question; but I cannot help remarking, with surprise, that it is singular any doubt should have existed on the subject. None of the alleged differences are of any value as indications of specific distinctness; and the figures given (especially those by J. V. Thomson) are clearly referable to *Ascaris*

*mystax*. In conclusion, therefore, I would assure all medical gentlemen who may meet with cases of *Ascarides* that they would confer on entozoologists a favour, and on science an advantage, if, when in any doubt as to the specific character of these or other parasites, they would kindly submit them to the scrutiny of those who are intimately conversant with the science of helminthology\*.

## 12. TRICHOCEPHALUS DISPAR, Rudolphi.

*T. dispar*, Rudolphi, Bradley, Cuvier, Bremser, Chiaje, Bellingham, Mayer, Busk, Siebold, Dujardin, Tutschek, Pruner, Wedl, Diesing, Küchenmeister, Leidy, Moquin-Tandon, Eberth, Cobbold, Weinland, &c.

*T. hominis*, Goeze, Schrank, Gmelin, Rudolphi, Jördens, Brera, Lamarck, Blanchard.

*T. simiæ patas*, Treutler.

*T. lemuris*, Rudolphi.

*T. palæformis*, Rudolphi, Dujardin.

*Trichuris*, Buttner & Røederer, Wagler, Bloch.

*Ascaris trichiura*, Linnæus, Müller, Werner.

Few of the entozoa have excited more interest than this species, partly owing to the angry discussion which its discovery inaugurated, and partly on account of its singular and elegant whip-like appearance. The original name of *Trichuris*, given to it by Buttner, could not, of course, be allowed to stand when it became evident that the so-called tail was in reality the head and neck. The *Trichocephalus* is generally thought to be scarce in England—a persuasion which has probably arisen from the negligence of pathologists, whose arduous duties connected with the superintendence of *post mortem* examinations have perhaps left them little time for these inquiries†.

On the other side of the Channel this worm is so abundant in some localities that Mons. Davaine calculates that not less than one-half of the inhabitants of Paris are infested by it. The general organization of *Trichocephalus* has been well investigated, more particularly by Mayer, Siebold, Dujardin, Blanchard, Küchenmeister, and Eberth; but (as I have recently shown in my third memoir on “Entozoa,” published in the Linnean Society’s ‘Transactions’) the statement of Küchenmeister that there are no external appendages in the female of *Trichocephalus* comparable to those known to exist in the allied *Trichosomata* is incorrect. In connexion with these organs I have also endeavoured to throw light upon the conflicting statements of Mayer and Eberth, and I have demonstrated more fully the very

\* Since writing the above, with great good fortune and most opportunely, a third case has been brought under my notice,—Dr. Lankester, F.R.S., having very kindly placed in my hands, last Thursday evening (Nov. 20), a nematode sent to him by Mr. Scattergood, of Leeds. This worm is *A. mystax*, from a child only thirteen months old, whose case I hope shortly to lay before the medical profession. I now exhibit the parasite to the Society. (See ‘The Lancet’ for Jan. 10, 1863, p. 31, where the case has since appeared.—T. S. C.)

† To Dr. Rutherford Haldane, F.R.C.P., Physician and formerly Pathologist to the Royal Infirmary of Edinburgh, I am indebted for several perfectly fresh examples of this worm.

marked differences existing between the males of *Trichocephalus affinis* and *T. dispar*. The presence of the last-named species in the human body is fortunately attended with very little inconvenience; but its development and mode of gaining access to the host has nevertheless been recently made the subject of diligent inquiry. Leuckart's, and especially also Virchow's, researches have entirely disproved Küchenmeister's notion that *Trichinæ* are the young of *Trichocephalus*; and the experiments of Davaine render it probable that the young get into the human body in a manner very similar to those of *Ascaris lumbricoides*. The latter authority finds that the eggs undergo no development whilst yet lodged within the host's intestine, and they are expelled *per anum* in the immature condition in which they make their escape from the body of the parent worm. It further appears that, after their expulsion, a period of six months must elapse before the embryonic formation commences—an interesting circumstance, and one which satisfactorily explains why it was that my own feeding-experiments (on a chicken and rabbit) with the fresh eggs of *Trichocephalus affinis* gave only negative results. According to Davaine, the fully developed embryo measures  $\frac{1}{333}$ rd of an inch in length, and to a certain extent resembles the parent, tapering gradually from behind forwards.

### 13. TRICHINA SPIRALIS, OWEN.

*T. spiralis*, Owen, Wood, Farre, Henle, Diffenbach, Fricke and Oppenheim, Paget, Knox, Harrison, Hodgkin, Leblond, Siebold, Kobelt, Nordmann, Valentin, Bischoff, Dujardin, Svitzer, Luschka, Küchenmeister, Gairdner, Sanders and Kirk, Cobbold, Herbst, Zenker, Virchow, Leuckart, Weinland, &c.

The experimental researches of Herbst, Leuckart, and more especially those of Virchow, afford us an almost complete knowledge of the development and economy of this minute parasite, the facts of which may be briefly summed up as follows:—(1.) *Trichinæ* are introduced into the human body by the ingestion of trichinous pork. This diseased meat, if imperfectly cooked or indifferently prepared in the form of sausages or hams, is capable of giving rise to severe febrile symptoms in those who partake of it; and in the case of a woman under the care of Prof. Zenker, of Dresden, it was the sole cause of death. There is reason to believe others have likewise perished from a similar cause. In hams long prepared and well smoked the *Trichinæ* are found dead; they resist death in decomposing flesh, also during a prolonged immersion in water; in the encysted condition they are unaffected by tolerably strong acid solutions. (2.) *Trichina spiralis* forms the type of a distinct genus of nematodes; it has no genetic relation whatever to *Trichocephalus dispar*; it reproduces viviparously like *Filaria dracunculus*. (3.) Non-encysted *Trichinæ* may exist in the flesh of animals without being visible to the naked eye; whilst encysted *Trichinæ*, where cretification has not commenced, are difficult of detection without the aid of a pocket lens. The latter observation is based on appearances which

I have also myself noticed in connexion with two cases where nearly all the voluntary muscles of the human body were crowded with *Trichinæ*. (4.) In a few days after the ingestion of fresh-encysted *Trichinæ*, the worms acquire sexual distinction and maturity; the ova and young are in a few more days equally rapidly developed, and the latter soon escape from the parent, *per vaginam*, to commence active migrations on their own account; this they do by penetrating the walls of the intestine of the host, from whence they pass quickly to the voluntary muscles, where they eventually become encysted. According to Virchow's conclusive testimony, all these phenomena occur within the space of a single month; and, in his experiments, even as early as three weeks after ingestion the young were found to equal in size those that he administered at the commencement. The genesis and migrations of *Trichina* are therefore astonishingly rapid, and probably without parallel in this class of parasites. ('Comptes Rendus,' for July 1860, p. 13; also in 'Annales des Sciences Naturelles,' series 4, vol. xiii. p. 109.) The organization of *Trichina* in the encysted condition has been accurately given by Owen, Luschka, Bischoff, Valentin, Sanders and Kirk, &c., its adult and embryonic structure being also beautifully illustrated by Leuckart ('Untersuchungen über *Trichina spiralis*,' 1861; and in the 'Göttinger Nachrichten' for April 30, 1860, p. 135).

#### 14. FILARIA MEDINENSIS, Gmelin.

*F. medinensis*, Gmelin, Olfers, Rudolphi, Jacobson, Lamarek, Gescheidt, Chiaje, Richeraud, Chapotin, Williamson, Scott, Adam, Kennedy and Smyttan, Young and Jamieson, Cuvier, Weihe, Oppenheim, Charvet, Marc and Laennec, Leblond, Wagner, Clark, Blott, Eschricht, Oken, Siebold, Dujardin, Dutschek, Creplin, Fischer, Heath, Brulatour, Maisonneuve, Diesing, Carter, Busk, Cobbold, Cezilly, Robin, Thibaut and Benoit, Moquin-Tandon, Weinland, &c.

*F. dracunculus*, Bremser, Clelland, Pruner.

*Furia medinensis*, Modeer.

*Gordius medinensis*, Linnæus, Bruguière.

*Vermis medinensis*, Grundler.

*Dracunculus*, Lister, Gallandatus.

*D. persarum*, Kämpfer.

This species is well known to our medical brethren in India and the East; and probably no parasite has had so much written about it as the Guineaworm. Among modern investigators nothing can equal the patience and perseverance of Mr. Carter, F.R.S., of Bombay, who, month after month, for many years past, has been devoting his energies towards the elucidation of the habits, economy, and development of the *Dracunculus*. The structure of the adult female is well known; but it is still extremely doubtful if the male has ever been seen. Prof. Owen believed himself to have found the male, and he accordingly described it; but Mr. Busk's subsequent observations, as well as the experiences of those who, from their position, have become familiar with *Dracunculus*, alike go to prove that we are still

unacquainted with the male. It is by no means improbable, however, that one or other of the numerous male examples of *Filaria* belonging to Mr. Carter's closely allied genus *Urolabes* may turn out to be the long sought-for male of *Dracunculus*. The anatomy of the adult viviparously producing female is well known; but its mode of gaining access to the body is not absolutely determined, although an ultimate and complete solution of the problem cannot long be delayed. With extreme probability we may fairly assume that the young gain access by permeating the sudorific ducts of the skin, and that the maturation of the ova and embryos takes place after they have invaded the host. Females extracted from the human body have been described as attaining a length of 8, 10, or even 16 feet; but it is worthy of remark that Mr. Carter has never found them more than 32 inches long in the island of Bombay. The grown females resemble elongated sacs distended from end to end with myriads of young *Filariae*. The discovery of their viviparous mode of reproduction is, I believe, due to Jacobson; yet it is only within comparatively recent times that this discovery has become generally recognized. The structure of the young has been ably investigated by Carter, Busk, Robin, Moquin-Tandon, and others; and I have myself independently worked out their anatomy from specimens of remarkably fine *Dracunculi*, kindly placed in my hands by the late Sir George Ballingall. I found the young in a beautiful state of preservation, although the adult females had been preserved in Prof. Ballingall's private museum for a period of thirty years. In regard to the structure of the young, most of us agree in recognizing a slightly trilobed or tripapillated mouth; but Carter fails to recognize these tubercles, regarding the oral aperture as simple or "punctiform;" the body throughout its three upper fourths is cylindrical and finely striated transversely, after which it rapidly contracts to form the slender sharply-pointed tail. Robin, Moquin-Tandon, and myself recognize a distinct, rounded anal orifice; but whilst Prof. Busk has not recognized its existence, Carter, on the other hand, calls that which we described as the anus a gland, placing the alimentary outlet on one side and a little above it. Carter (whose figures, by-the-by, are very diagrammatic) may possibly be right; but I must further observe that Robin describes the anus as surrounded by a small hood or suspensory contractile lip, whilst he also speaks of a prolongation of the intestine downwards in the form of a *cul de sac* behind and beyond the anal orifice. The walls of the digestive tube are transparent and homogeneous, and fill up the perivisceral cavity without being organically united to the parietes of the body. Other disputed points in respect of the structure of the young cannot here be particularized; but in connexion with their peculiar economy both Busk and Robin have noticed the important fact that they will revive after having undergone a considerable amount of desiccation. Into the antecedent history and probable genetic relations of *Dracunculus*, we do not now propose to enter; but one interesting circumstance seems to me especially worthy of notice. Mr. Carter mentions that in a school of fifty boys bathing in a certain

pond, whose muddy sediment swarmed with the microscopic Tank-worm (*Urolabes palustris*, Carter), twenty-one were attacked with *Dracunculus* during the year; whilst the boys of other schools bathing elsewhere in the island were not infected, with the exception of one or two individual instances here and there. This remarkable occurrence, taken in connexion with Schneider's discoveries (respecting the causes inducing sexual maturity in *Alloionema appendiculatum* infesting the Black Slug, and in *Pelodytes hermaphroditus* infesting Snails), and also in combination with a multitude of other facts, some recorded by recent investigators, and others handed down to us by earlier writers, convincingly suggest the following conclusions:—(1.) The *Dracunculus* is a bisexual nematode, the female being parasitic during a portion of its lifetime. (2.) The male is probably very much smaller, non-parasitic so far as animals are concerned, and in all likelihood a *constant* inhabitant of fresh water and the mud of marshes or low-lying districts in the East. (3.) Guinea-worms do not gain access to the human body indirectly, by the mouth or stomach of the host, but directly, by penetrating the skin. (The young when introduced into the stomach of animals rapidly perish, as proved by Dr. Forbes.) (4.) The young acquire sexual maturity after their escape from the parent, the sexes associating in muddy waters during the monsoon, soon after which period the males probably perish, the females being left to watch their opportunity for further development by migration into the human body. (5.) Within the host it gives rise to a formidable entozootic disease (*dracunculiasis* of Galen), which, after prolonged monsoons, is not unfrequently severely endemic. (In the above remarks I have referred more particularly to the writings of Busk in 'Trans. Micr. Soc.,' old series, vol. ii. p. 65; of Moquin-Tandon in his 'Zoologie Médicale;' of Robin in 'Gazette Médicale de Paris,' 3rd series, vol. x. p. 365; and of Carter in 'Annals of Nat. Hist.' 3rd series, vol. iv. &c.)

#### 15. FILARIA LENTIS, Diesing.

*F. lentis*, Diesing, Moquin-Tandon, Weinland.

*F. oculi-humani*, Nordmann, Gescheidt, Ammon, Siebold, Leidy.

*F. oculi*, Owen, Moquin-Tandon.

As Küchenmeister suggests, this worm may possibly turn out to be identical with the *Filaria lacrymalis* (Gurlt), a viviparous species infesting the eye of the horse. It was first discovered by Nordmann (1831) in a case of lenticular cataract under the care of Von Gräfe, and subsequently found by Jüngken under similar circumstances. Under the title of *F. oculi*, Moquin-Tandon (in his 'Zoologie Médicale') speaks of certain minute *Filaria*, "not uncommon in the negroes of the Angola coast;" and he gives other localities of its occurrence. As, however, he does not state what part of the body is infested by them, I am inclined to think the authorities he quotes have mistaken the little *Oxyurus vermicularis* for the species in question. In both the well-known cases above referred to, the *Filaria* appear to have been immature, notwithstanding that the first was described as possessing ovaries, oviducts, &c.

16. *STRONGYLUS BRONCHIALIS*, Cobbold.

*S. longevaginatus*, Diesing, Küchenmeister, Weinland.

*Filaria bronchialis*, Rudolphi, Owen, Leidy.

*F. hominis bronchialis*, Rudolphi, Dujardin, Diesing, Weinland.

*F. lymphatica*, Moquin-Tandon.

*Hamularia lymphatica*, Treutler, Jördens.

*H. subcompressa*, Rudolphi, Bremser.

*Tentacularia subcompressa*, Zeder.

Diesing and Weinland have expressed their suspicions as to the identity of *Filaria bronchialis* with *Strongylus longevaginatus*; whilst Küchenmeister has gone further and pronounced them to be one and the same species. Concurring in this view, I have thought it right to combine the specific title originally given by Rudolphi with the generic allocation employed by Diesing; and if helminthologists generally adopt our views of their identity, I think they will admit the propriety of the nomenclature here superscribed.

The original specimens were discovered by Treutler in Germany, during the winter of 1791, in the bronchial glands of an emaciated subject; whilst those sent to Diesing for description were discovered by Dr. Fortsitz at Klausenberg, in Transylvania, in the lungs of a boy six years old.

17. *EUSTRONGYLUS GIGAS*, Diesing.

*E. gigas*, Diesing.

*Strongylus gigas*, Rudolphi, Otto, Cuvier, Brera, Blainville, Chiaje, Owen, Gurlt, Dujardin, Stratton, Jackson, Blanchard, Küchenmeister, Leidy, Weinland.

*S. renalis*, Moquin-Tandon.

*Ascaris renalis*, Gmelin.

*A. visceralis*, Gmelin.

*A. canis et martis*, Schrank.

*Fusaria renalis*, Zeder.

*F. visceralis*, Zeder.

*Lumbricus in renibus*, Blasius.

*L. martis et canis renalis*, Redi.

*L. sanguineus in rene canis*, Hartmann.

*L. gulonis sibirici*, Pallas.

*Diocotophyme*, Collet-Meygret.

Though fortunately very rare in man, this worm is known to occur in a great variety of animals, especially in Weasels. According to Weinland and Jackson, it is particularly abundant in the kidney of the North American Mink (*Mustela vison*, Cuvier), destroying the substance of the organ, the walls of which become the seat of calcareous deposit. It has been found in the dog, wolf, glutton, raccoon, otter, seal, ox, and horse. Otto, Owen, and Blanchard have given descriptions of its anatomy, all of them recognizing a well-defined nervous system; further researches, however, are needed to explain away certain discrepancies in their writings, and especially also in regard to the water-vascular system, the very existence of

which (in nematodes generally) is denied by Dr. Williams of Swansea.

#### 18. SCLEROSTOMA DUODENALE, Cobbold.

*Strongylus quadridentatus*, Siebold.

*Anchylostoma duodenale*, Dubini, Siebold, Pruner.

*Ancylostomum duodenale*, Diesing, Leidy, Küchenmeister, Moquin-Tandon, Creplin, Weinland.

This interesting worm was first discovered by Dubini at Milan, and, though at first thought rare, is now known to be tolerably common throughout Northern Italy. According to Pruner, Bilharz, and Griesinger, it is remarkably abundant in Egypt, the latter authority calculating that about one-fourth of the people are constantly suffering from a severe anæmic chlorosis, occasioned solely by its presence in the small intestines.

From the accurate descriptions of Siebold it becomes quite evident that this worm is closely allied to his genus *Syngamus*; and, as he has himself remarked, it might have been placed in the genus *Sclerostoma*. In this genus I have arranged it because the asymmetrical disposition of the so-called dental organs is not of itself sufficient for the establishment or retention of Dubini's genus *Anchylostoma*; otherwise, out of respect for the discoverer, I would prefer his nomenclature. *Sclerostoma duodenale* closely resembles the little worm (*Syngamus trachealis* of Siebold, *Sclerostoma syngamus* of Diesing) which gives rise to the "gapes" in birds; but the male of the latter species is comparatively small, whilst the vaginal outlet of the female is placed much further forward. Küchenmeister's 'Manual' furnishes an excellent account of the "Ægyptian chlorosis" produced by *Sclerostoma duodenale*; and those who are interested in checking the "gape disease" of fowls I may be permitted to refer to my recent memoir on '*Sclerostoma syngamus*,' in the 5th volume of the 'Journ. of the Proceed. of the Linn. Soc.,' Zool. Div., p. 304.

#### 19. SPIROPTERA HOMINIS, Rudolphi.

*S. hominis*, Rudolphi, Dujardin, Diesing, Owen, Leidy, Moquin-Tandon, Weinland, Molin.

? *S. hominis* (var. *major*), Brighton.

? *S. gigas pullus*, Bremser.

*S. rudolphii*, Delle Chiaje.

Fresh instances of the presence of this worm in the human body are necessary to satisfy many as to its being a good species; but the occasional occurrence of nematodes within the *vesica urinaria* is a fact placed beyond dispute. The original six specimens of *Spiroptera*, discovered by Barnett in England, were transmitted to Rudolphi for description; and there do not seem to be fair grounds for disputing his accuracy. It may be well doubted, however, if Brighton's nematode, though found under similar circumstances in America, can be referred to the same species.



## 20. OXYURIS VERMICULARIS, Bremser.

*O. vermicularis*, Bremser, Chiaje, Dugés, Deslongchamps, Lamarck, Dutschek, Dujardin, Mayer, Siebold, Pruner, Blanchard, Leidy, Küchenmeister, Moquin-Tandon, Weinland.

*Ascaris vermicularis*, Linnæus, Müller, Fabricius, Bloch, Goeze, Werner, Gmelin, Schrank, Jördens, Brera, Rudolphi, Nitzsch, Creplin, Raspail, Owen, Bellingham.

*Fusaria vermicularis*, Zeder.

So far as the anatomy of *Oxyuris* is concerned, the investigations of numerous parasitologists, and more especially those of Walter (in the eighth volume of Siebold and Kölliker's 'Zeitschrift'), have left little to be accomplished; but the precise mode in which the young gain access to the human body is still uncertain. It is well known that the eggs have embryos developed within them prior to their escape from the parent, and in this respect, therefore, they differ from *Ascaris lumbricoides* and *Trichocephalus* on the one hand, and from the viviparous *Dracunculus* on the other. In all probability, the young escape from the eggs soon after the latter are expelled or migrate *per rectum*, and, like others of the *Nematoda*, gain access to the human body with our food whilst they are still in a sexually immature condition.

## 21. TÆNIA SOLIUM, Linnæus.

*T. solium*, Linnæus, Gmelin, Jördens, Rudolphi, Cuvier, Olfers, Chiaje, Mehlis, Owen, Creplin, Nordmann, Dujardin, Diesing, Küchenmeister, Moquin-Tandon, Weinland, Leuckart, &c.

*T. solium* (var. *abietina*), Weinland.

*T. osculis marginalibus solitarius*, Linnæus, Bradley.

*T. cucurbitina*, Pallas, Bloch, Batsch, Schrank.

*T. cucurbitina plana pellucida*, Goeze.

*T. humana armata*, Brera.

*T. dentata*, Gmelin.

*T. fenestrata*, Chiaje.

*T. vulgaris*, Werner.

*T. communis*, Moquin-Tandon.

*T. albopuncta hominis*, Treutler.

*T. hydatigena anomala*, Steinbach.

*T. hydatigena suilla*, Fabricius.

*T. finna*, Gmelin.

*T. cellulosa*, Gmelin, Treutler.

*Cysticercus cellulosa*, Rudolphi, Bremser, Chiaje, Owen, Blainville, Sömmering, Gurlt, Nordmann, Gescheidt, Creplin, Siebold, Dujardin, Diesing, &c.

? *C. fischerianus*, Laennec.

? *C. dycystus*, Laennec.

? *C. turbinatus*, Kæberle.

? *C. melanocephalus*, Kæberle.

*Hydatigena cellulosa*, Lamarck, Nordmann.

*Hydatis finna*, Blumenbach.

*Fermis vesicularis*, Brera.

*Finna humana*, Werner.

*Vesicaria finna suilla*, Schrank, Bay.

*V. hygroma humana*, Schrank, Bay.

*V. lobata suilla*, Fabricius.

Now that the organization and mode of development of this species is so well understood, it is a matter of regret that the manifest errors of earlier writers are not more carefully excluded from our ordinary manuals of zoology and comparative anatomy. I allude, for example, to such points as the still asserted presence of a mouth and digestive canal in *Tæniadæ*, which cannot be maintained after repeated demonstrations have clearly proved this view to be erroneous. These falsely so-called alimentary canals constitute the water-vascular system, and, without entering into minute details, I may here remark, in passing, that they do not form tubes of uniform thickness throughout their course, but present distinct bulbous enlargements at every joint, where the transverse branches are given off. This I have ascertained from the careful injection of a fresh Tapeworm recently sent me from Brighton by Mr. Murray, F.R.C.S.E.

In regard to the now well-established discovery of Küchenmeister respecting the development of the common Tapeworm (*T. solium*) from measy pork, I should not deem it worth while dwelling on the subject, did it not unfortunately happen that a few months back MM. Pouchet and Verrier gave a general denial to the statements of experimental parasitologists respecting the development of Tapeworms from *Cysticerci*. Those who have read the statement, as presented in the 'Comptes Rendus' (for May 5th, 1862, p. 958), or the translation of it recently given in the July number of the 'Annals of Natural History' (3rd series, vol. x. p. 77 *et seq.*), will at once perceive the causes which have led these gentlemen to form conclusions at variance with the experience of at least nine-tenths of the leading helminthologists of the day. As Prof. van Beneden remarks, they err greatly in supposing that any one regards the *Cœnurus* of the sheep as the larva of *Tænia serrata* of the dog, seeing that nearly all Continental experimentalists, following Küchenmeister, have maintained that the *Scolex* condition of this last-named Tapeworm is unquestionably the *Cysticercus pisiformis* of hares and rabbits. The researches of Leuckart are especially conclusive on this point; and my own experiments at Edinburgh in 1856 have left no doubt in my mind as to the correctness of this view. The negative result obtained by MM. Pouchet and Verrier in their last experiment (where they fed two dogs each with a hundred heads of *Cœnurus cerebralis*) certainly seems contradictory as regards the *Tænia cœnurus*; whilst, on the other hand, it tends to confirm the correctness of our opinion that *Cœnurus cerebralis* and *Tænia serrata* have no genetic relation subsisting between them. I, for one, however, shall be glad to repeat these and other similar experiments; and I may here also remark that it is of very little use for any one not familiar with the species to attempt these inquiries. I strongly suspect,

with Prof. van Beneden, that here lies the secret of MM. Pouchet and Verrier's adverse conclusions.

22. *TÆNIA MEDIOCANELLATA*, Küchenmeister.

*T. mediocanellata*, Küchenmeister, Müller, Gurlt, Eschricht, Van Beneden, Leuckart, Weinland.

*T. solium*, Bremser (and others, in part).

*T. dentata*, Nicolai.

*T. cucurbitina grandis saginata*, Goeze.

*T. inermis*, Moquin-Tandon.

*T. tropica*, Moquin-Tandon.

? *T. e capite bonæ spei*, Küchenmeister.

? *T. capensis*, Moquin-Tandon.

*Tæniarhynchus mediocanellata*, Weinland.

*Cysticercus tæniæ mediocanellatæ*, Leuckart.

The establishment of this species as distinct from *T. solium* is unquestionably due to Küchenmeister; but it is not a little curious to observe how accurately this determination was foreshadowed by that shrewd naturalist and theologian, J. A. E. Goeze, who, in his 'Versuch einer Naturg. der Engeweidwürmer thierischer Körper,' clearly indicates two forms of the common Tapeworm, remarking (p. 278):—"Die erste ist die bekannte grosse, mit langen dicken und gemästeten Gliedern, die ich *Tænia cucurbitina, grandis, saginata*, nennen will." The same author (p. 245), it will be remembered, also pointed out the resemblance subsisting between the tapeworm of the cat (*T. crassicolis*) and the vesicles ("Krystallblasen") and their contained "erbsförmige Blasen" (*Cysticercus fasciolaris*) of the mouse. It is unnecessary here to indicate the distinctive peculiarities of the two species; but the characters presented by the head are certainly insufficient to warrant the formation of a new genus for the reception of this species. Thinking otherwise, Dr. D. F. Weinland has suggested the generic title of *Tæniarhynchus*. In regard to the original development of this hookless flat-headed tapeworm, the recent experimental researches of Leuckart incontestably prove that the "measles," or *Cysticerci* which produce it, are to be found in the muscles and internal organs of cattle; and in his valuable work ('Die menschlichen Parasiten,' p. 406 *et seq.*), now in course of publication, he gives a condensed account of his experiments with the fresh eggs of *Tænia mediocanellata*. He fed two calves with the proglottides of this worm. The first animal experimented on died from a violent attack of the measles-disease, which resembles a kind of leprosy. On dissecting this calf, the muscles were found filled with measles, or imperfectly developed scoleces. On the second occasion a smaller number of proglottides (in all about fifty) were administered; but the febrile symptoms again appeared with such virulence that Leuckart thought this animal would die also. Fortunately, after the lapse of a fortnight from their commencement, some abatement of the disease took place; and this gradually continued until the animal was perfectly restored to health.

Eight-and-forty days subsequent to the feeding (*i. e.* reckoning from the earliest days of alimentation, for the feedings were continued at intervals up to the eighteenth day) Prof. Leuckart extirpated the left cleido-mastoid muscle, and whilst performing the operation had the satisfaction of seeing the cysticercus-vesicles lodged within the muscles. They were larger and more opalescent than those of *Cysticercus (Tæniæ) cellulosa*, but, nevertheless, permitted the recognition of the young worms through their semitransparent coverings. The heads of the contained cysticerci exhibited all the distinctive peculiarities presented by the head of the adult strobila (*Tænia mediocanellata*); and thus, taking the results of this experiment in connexion with previously ascertained facts, we are supplied with the most unequivocal evidence that man becomes infested by this second form of Tapeworm by eating imperfectly cooked veal and beef. In all probability, other animals are not liable to harbour the *Cysticercus tæniæ mediocanellatæ*; for Leuckart also tried to infect a sheep (to which he administered about sixty proglottides); but, on examining the flesh after the lapse of eight weeks, he failed to detect the presence of a single cysticercus-vesicle\*.

### 23. TÆNIA ACANTHOTRIAS, Weinland.

*T. (Cysticercus) acanthotrias*, Weinland, Moquin-Tandon, Leuckart.

*Acanthotrias*, Weinland.

The specific distinctness of this new Tapeworm is founded on the examination of several cysticerci, "preserved in the Collection of the Medical Improvement Society, Boston, and in the Anatomical Museum, Cambridge, U. S." From twelve to fifteen of these cysts were found by Dr. Jeffries Wyman (1845) in the muscles of a woman about fifty years of age—a dissecting-room subject at Richmond, Va. Dr. Weinland, of Frankfort, during his stay in America (1858), on carefully examining one of these cysticerci, made the very curious and, in some respects, unique discovery that its rostellum was furnished with three rows of hooks, fourteen in each, the hooks themselves presenting the usual characters. Dr. Weinland proposes to elevate this species as the type of a new genus (*Acanthotrias*); but unless the (yet to be discovered) strobila displays other characters differing from those of ordinary Tapeworms, it is, perhaps, better to retain it among the *Tæniæ*.

### 24. TÆNIA FLAVOPUNCTA, Weinland.

*T. flavopuncta*, Weinland, Moquin-Tandon.

? *T. flavomaculata*, Molin.

*Hymenolopis flavopuncta*, Weinland.

The existence of this worm as a distinct species is also due to the

\* Since the above was written, I have received from Mr. Frederick Turner, of 265 Fern Bank, Glossop Road, Sheffield, a finely preserved Tapeworm-head for examination. "It was from a very long worm," and is undoubtedly referable to *Tænia mediocanellata*, as the Society will perceive by inspection.

shrewd investigations of Dr. Weinland, made during his visit to America. Unfortunately, no perfect specimen has been seen; but, from portions of at least six examples of the strobila, Dr. Weinland has clearly established its claim to be recognized as a good species. The proglottides are short; and "there is a yellowish spot, clearly visible to the naked eye, situated about the middle of each joint, which reminds us very much of the colour and situation of the genital organs as known in *Bothryocephalus*." The reproductive orifices occur all along one side of the worm; and the eggs are unusually large. Only one instance of the occurrence of this species is yet recorded; and on this occasion they were obtained by Dr. Ezra Palmer, in considerable numbers, from an infant nineteen months old. They were expelled without medicine, their presence not having been even suspected. (See D. F. Weinland's 'Essay on the Tapeworms of Man,' p. 49; also his 'Beschreibung zweier neuer Tænioiden aus dem Menschen,' 1861, p. 8, t. 4.)

### 25. *TÆNIA MARGINATA*, Batsch.

*T. marginata*, Batsch, Rudolphi, Dujardin, Diesing, Leuckart.

*T. cucurbitina*, Pallas, Bloch (both in part).

*T. lupina*, Schrank.

*T. cateniformis lupi*, Goeze.

*T. ex cysticercu tenuicollis*, Küchenmeister.<sup>1</sup>

*T. tenuicollis*, Günther, Moquin-Tandon.

*T. hydatigena*, Pallas, Bloch.

*T. hydatula*, Linnæus.

*T. globosa*, Rudolphi, Gmelin.

*T. simiæ*, Gmelin.

*T. ferrarum*, Gmelin.

*T. caprina*, Gmelin.

*T. ovilla*, Gmelin.

*T. vervicina*, Gmelin.

*T. bovina*, Gmelin.

*T. apri*, Gmelin.

*Halysis marginata*, Zeder.

*Cysticercus tenuicollis*, Rudolphi, Deslongchamps, Blainville, Bremser, Gurlt, Houston, Tschudi, Gulliver, Eschricht, Dujardin, Creplin, Leuckart, Gervais, Diesing, Leidy, Küchenmeister, Weinland, Cobbold.

? *C. visceralis hominis*, Rudolphi.

*C. visceralis*, Rudolphi.

? *C. hepaticus*, Chiaje.

? *C. vesicæ hominis*, Creplin.

*C. lineatus*, Laennec.

*C. clavatus*, Zeder.

*C. globosus*, Zeder.

*C. simiæ*, Zeder.

*C. caprinus*, Zeder.

*C. cercopitheci cynomologi*, Leuckart.

*C. phacochæri æthiopici*, Cobbold.

- C. potamochari penicillati*, Cobbold.  
*C. cynocephali porcarii*, Cobbold (MS.).  
*Hydatigena orbicularis*, Goeze.  
*H. globosa*, Batsch.  
*H. oblonga*, Batsch.  
*Hydatis globosa*, Lamarck.  
*Hydra hydatula*, Linnæus.  
*Hydatula solitaria*, Viborg.  
*Vesicaria orbicularis*, Schrank.  
*Vermis vesicularis eremita*, Bloch.

This species infests man only in the immature or cysticercal condition, the full-grown tapeworm (strobila) being found in the dog and wolf. It has often been confounded with the *Tænia serrata*, from which, however, it differs in the comparatively bulky size and peculiar form of its hooks; it is also a much larger worm, the proglottides nearly equalling those of *T. solium*. It does not seem possible for the strobila to take up its abode in the human body, because Dr. Möller's attempts to infest himself with it (by swallowing several specimens of *Cysticercus tenuicollis*) were unsuccessful. In the scolex condition this worm has an unusually wide distribution; for, in addition to its occasional presence in man, it has likewise been found in various monkeys, in cattle and sheep, in many other ruminants, in horses, in swine, and even in squirrels. The experiments of Küchenmeister, Leuckart, Luschka, and Röhl have fully established the fact that these various animals and ourselves become infested with the so-called *Cysticercus tenuicollis* by accidentally swallowing the eggs of *T. marginata*, or *Tænia ex cysticerco tenuicollis* (Küchenmeister), which is the same thing. The cysticerci occasionally attain an enormous size, as was the case with those I obtained from the Wart and Red River Hogs which died at the Zoological Society's Gardens in 1859 and 1860, and which I at first supposed to be referable to two hitherto unknown Tapeworms (Proc. Zool. Soc. March 12, 1861). Leuckart, however, to whom I forwarded one of the specimens, has corrected me in this matter. In one the caudal vesicle was pyriform and about 5 inches in length; in another it had the size and form of a cricket-ball. Eschricht and Schleissner have shown that these cysticerci are sometimes associated with *Echinococcus* in Iceland.

## 26. TÆNIA ECHINOCOCCUS, Siebold.

- T. echinococcus*, Siebold, Leuckart.  
*T. echinococcus scolicipariens*, Küchenmeister.  
*T. granulosa*, Gmelin, Prochaska.  
*T. visceralis socialis granulosa*, Goeze.  
*T. nana*, Van Beneden.  
*Echinococcus hominis*, Rudolphi, Bremser, Rendtorff, Chiaje, Müller, Owen, Gescheidt, Eschricht, Kühn, Gluge, Bright, Focke, Creplin, Hausmann, Doyère, Rokitansky, Siebold, Lüdersen, Simon,

Cruveilhier, Curling, Portal, Foster, Thompson, Annesley, Keber, Virchow, Aran, Vögel, Lebert, Major, Livois, Thiel, Moquin-Tandon, Davaine, &c.

*E. veterinorum*, Rudolphi, Bremser, Blainville, Gurlt, Allessandrini, Owen, Dujardin, Gervais, Leuckart, Huxley, Weinland, &c.

*E. scolicipariens*, Küchenmeister.

*E. altricipariens*, Küchenmeister, Cobbold.

*E. polymorphus*, Diesing, Leidy.

*E. granulatus*, Rudolphi.

*E. simia*, Rudolphi.

*E. giraffæ*, Gervais.

*Polycephalus hominis*, Goeze, Jördens.

*P. humanus*, Zeder.

*P. granulatus*, Zeder, Cloquet.

*P. echinococcus*, Zeder, Tschudi.

*Acephalocystis*, Laennec, Diesing, Dujardin, Nitzsch, Siebold, Van Beneden, Moquin-Tandon, &c.

*A. ovoidea*, Laennec, Cloquet, Deslongchamps, Chiaje.

*A. granulosa*, Laennec, Cloquet, &c.

*A. surculigera*, Laennec, &c.

*A. endogena*, John Hunter, Owen.

*A. exogena*, Kuhl.

*A. macaci*, Cobbold.

*A. ovis tragelaphi*, Cobbold.

*Vesicaria granulosa*, Schrank.

*Hydatigena granulosa*, Batsch.

*Hydatis*, Lüdersen, Rudolphi, Olfers, Bremser, Leuckart, Kühn, Tschudi, Dujardin, Wilson, Rokitansky, Moquin-Tandon, Barker, Davaine, &c.

*H. erratica*, Blumenbach.

Following Küchenmeister, Weinland and others suppose that there are two distinct forms of *Echinococcus* severally referable to different Tapeworms, one of which is on all hands admitted to be Von Siebold's *Tænia echinococcus*, the other an unknown *Tænia*, also supposed to infest dogs. That *Echinococci* vary much, both in regard to the number of cephalic hooks they display at certain intervals of growth, and also in respect of the mode of evolution of the scoleces, few will deny; but, according to Leuckart, we are not therefore warranted in accepting Küchenmeister's view as to the specific distinctness of certain forms. Like others, I had been led away by Küchenmeister's authority, although I have had abundant opportunity of investigating these singularly interesting larvæ. The grounds on which Leuckart disputes Küchenmeister's view are, I think, perfectly satisfactory; for he shows conclusively that the proportional number of hooks fluctuates in both forms, whilst the alleged differences in the size and character of the hooks themselves have reference to their degree of development ('Die menschlichen Parasiten,' p. 328 *et seq.*). If this view be generally accepted, it cannot fail to suggest important hints as to the best mode of checking that formidable

endemic known as the Echinococcus-disease of Iceland, the best account of which we owe to the researches of Eschricht.

My friend Dr. Arthur Leared, M.R.C.P., who has just returned from a short tour in Iceland, has undertaken to draw up a report on the present state of our knowledge on this subject (with a view to its being ultimately laid before the Icelandic Parliament); and he has ingeniously suggested that every dog should be efficiently physicked at a certain given time, and that all the excreta, tapeworms included, should be buried at a considerable depth in the soil. The experiment should be extended over several seasons. The mature *Tæniæ* thus destroyed would, it is conceived, cut off the supply of embryos and *Echinococci*, and the endemic might thus be averted. To this suggestion I would add that, in place of burying the excreta, they should, in all cases, be burnt. If this latter suggestion be not carried out, it is more than probable that multitudes of the minute embryos will escape destruction, and ultimately find their way into the human body. I have previously urged this preventive measure with the view of lessening the prevalence of other entozoa, both of man and animals; and I again, in a social point of view, respectfully invite attention to the importance of this rule. All entozoa (not preserved for scientific investigation and experiment) should be thoroughly destroyed by fire when practicable, and under no circumstances should they be thrown aside as harmless refuse. In the case of *Tænia echinococcus* the greatest difficulty likely to be experienced lies in the circumstance of the extreme minuteness of the strobila, which, in the full-grown state, does not exceed the eighth of an inch in length. It is almost certain to be overlooked; and I fear, therefore, the treatment suggested by Dr. Leared will only be attended with partially beneficial results. As an additional security, I would recommend that boiling-hot water be thrown over the floor of the kennels or enclosures where the dogs subjected to Dr. Leared's treatment are kept. In this way nearly all the embryos would be destroyed. In regard to the structure of *Echinococcus* itself, very little now remains to be made out. The literature of the subject is of very great extent. One of the best memoirs extant is that communicated by Prof. Huxley to this Society; and, from repeated original investigations, I have been enabled to follow out and satisfy myself as to the accuracy of most of the facts therein recorded. I have sought, however, very diligently for the internal cilia described by Huxley, Virchow, and Lebert, hitherto without success. Respecting the well-known hydatids or acephalocysts, the majority of them are clearly undeveloped larvæ of *Tænia echinococcus*, comparatively few of them being referable to other Tapeworms\*.

\* Since the above was written, an instance of Echinococcus-disease in a young female has very opportunely come under my notice at the Middlesex Hospital; this case, unhappily, terminated fatally. On Sept. 30, I secured, and fed a house-dog with, several hundreds of heads of the scoleces, which, in all respects, corresponded with those of *Echinococcus veterinorum*, and I hope to be able to extend this experiment after the production of the *Tæniæ*. (This experiment only gave a negative result—probably on account of the cysts having been accidentally steeped in a solution of carbonic acid before I received them.—T. S. C. : Jan. 1863.)



27. *TÆNIA NANA*, Siebold.

*T. nana*, Siebold and Bilharz, Küchenmeister, Leidy, Moquin-Tandon, Leuckart.

*T. ægyptiaca*, Bilharz.

*Diplacanthus nanus*, Weinland.

Küchenmeister, in his enthusiasm, was led to indulge the hope that this minute Tapeworm would turn out to be his imaginary *Tænia echinococcus altricipariens*; and I find that Van Beneden has fallen into the error of describing the *Tænia echinococcus* of Siebold under the title of *T. nana*. This is unfortunate. Weinland, on the other hand, has suggested the formation of a new genus for the reception of this worm; but the so-called "bifid" character of the hooks (as described by Bilharz) is a misnomer, the "doubled" appearance being simply due to the close approximation of the claw and the anterior root-process (Leuckart). The hooks are essentially the same as those of other *Tæniæ*, only they are very minute and slightly peculiar in form. The full-grown strobila attains a length of 8 or 10 lines, and carries from 150 to 170 joints. The cysticercal condition is at present unknown; but Leuckart thinks it may be found in some kind of insect.

28. *TÆNIA ELLIPTICA*, Batsch.

*T. elliptica*, Batsch, Rudolphi, Creplin, Gurlt, Dujardin, Diesing, Leuckart, Cobbold.

*T. canina*, Pallas (also probably of Linnæus, Werner, Eschricht, Van Beneden).

*T. canina felis*, Werner.

?*T. cucumerina*, Bloch, Rudolphi, Creplin, Gurlt, Dujardin, Diesing, Leuckart, Cobbold.

?*T. cateniformis*, Goeze, Gmelin, Rudolphi.

*T. cateniformis felis*, Gmelin.

*T. cuniceps*, Rudolphi.

?*T. osculis marginalibus oppositis*, Linnæus.

?*Alyselminthus ellipticus*, Zeder.

*A. cuniceps*, Zeder.

?*Halysis elliptica*, Zeder.

From the statement long ago made by Eschricht, that he had received a *Tænia canina*, passed by a negro slave at St. Thomas, Antilles, and more especially from the clear evidences recently adduced by Leuckart ('Die mensch. Parasiten,' p. 402), there cannot be a shadow of doubt that either the *Tænia elliptica* of the cat or the *T. cucumerina* of the dog may be reckoned amongst the cestodes liable to infest man. Those who, with Leuckart, regard the cat's tapeworm as a distinct species from the *Tænia cucumerina* of the dog will probably (on reading the evidence put forth by Leuckart) come to the conclusion that both these worms infest the human body. I have examined these reputedly distinct forms, and I find that there are differences of size and outline affecting the joints, but I cannot yet follow Leuckart and pronounce them to be

of sufficient value for specific separation. Like Dujardin, I have not seen the head of *T. elliptica*, neither am I acquainted with any good figure of the head\*. Goeze's drawings of *T. cateniformis* only represent a single row of little hooks; and it is well known that the same processes in *T. cucumerina* are very liable to fall off, so much so that it has been described as a hookless tapeworm. Van Beneden regards the two presumed distinct forms as identical, and, although his representations of the cephalic hooks of *T. canina* correspond very closely with those of the *T. cucumerina*, both of Dujardin and Leuckart, he speaks of three or four rows of hooks, whilst Dujardin says there are three, and Leuckart simply describes a succession ("mit einer mehrfachen Reihe"), though his excellent figure (fig. 118, p. 400, of his work) represents four; he also describes three or four rows as occurring in *T. elliptica*. It is therefore evident that variations occur in the same form as regards the head; and it is more than probable that differences of habitat may be sufficient to account for the variations of size and numerical development of the joints, which Leuckart regards as distinguishing marks between the elliptic tapeworm of the cat and the cucumerine cestode of the dog. Be this as it may, one or other of these forms has been noticed in the human subject several times; but as regards the source of their larvæ we are yet in uncertainty. When engaged (1856) in rearing *Tænia serrata* from *Cysticercus pisiformis*, I thought I had also hit upon the scoleces of *T. cucumerina*; but Leuckart has since extended my experiment by feeding rabbits with the proglottides of *T. cucumerina*, without producing any measles. Van Beneden has also tried to produce the young of *Tænia elliptica* in the rat, but without result. Weinland thinks the *Cysticercus* of *T. cucumerina* will be found in flies, and that dogs obtain the larvæ by their interesting habit of snapping at dipterous insects. This is, at least, ingenious †.

#### 29. BOTHRYOCEPHALUS LATUS, Bremser.

*B. latus*, Bremser, Blainville, Leblond, Rudolphi, Leuckart, Nitzsch, Mehlis, Chiaje, Owen, Creplin, Haselberg, Siebold, Eschricht, Valentin, Wawruch, Dujardin, R. Leuckart, Küchenmeister, Leidy, Weinland, &c. &c.

*Dibothrium latum*, Diesing.

? *Tænia lata*, Linnæus, Pallas, Bloch, Goeze, Batsch, Gmelin, Schrank, Carlisle, Jördens, Rudolphi.

? *T. vulgaris*, Linnæus, Werner, Retzius, Gmelin, Jördens.

*T. dentata*, Batsch, Gmelin.

\* I have now (Jan. 27, 1863) procured several heads of *T. elliptica*, and am still unable to pronounce the two forms to be distinct species.—T. S. C.

† In connexion with these views of Weinland and Leuckart, I may here mention that I have recently been feeding a number of cockroaches (*Blatta orientalis*) with the eggs of *Tænia cucumerina* of the dog, but I have not succeeded in rearing any *Cysticerci* in their bodies. Not discouraged by negative results (which often advance our science as much as positive ones), I shall presently feed them with the eggs of *T. elliptica* from the cat; and if I should succeed in thus giving the cockroaches the "measles," I shall have less hesitation in pronouncing Leuckart's opinion, as to the distinctness of these two tapeworm-forms, correct.

- T. tenella*, Pallas, Retzius.  
*T. grisea*, Pallas, Schrank.  
*T. membranacea*, Pallas, Batsch.  
*T. humana inermis*, Brera.  
*T.* (à anneaux courts), Bonnet.  
*T.* (sans épine), Andry.

For our knowledge of the anatomy of this species we are mainly indebted to the researches of Eschricht; and it is only very recently that we have become acquainted with any part of the history of its development, through the investigations of Dr. J. Knoch, of Petersburg ('Petersburger medicinische Zeitschrift,' 1861, No. 3). Some account of these interesting discoveries has already appeared in a review in the first volume of the 'Lancet' for the current year (p. 101); and from these researches it would appear that the well-known ciliated infusorial condition of the embryo undergoes its transformations whilst still living in open waters; from this medium it is subsequently transferred to the human body, in a passive manner, by the same waters being used as drink. A full account of the larval metamorphoses is still needed; and we are promised this desideratum in the 'Memoirs' of the Petersburg Academy\*. In the mean time, it may be remarked that two distinct species of *Bothryocephalus* have been described as occurring in the human body. One described by Mayer, of Geneva, is extremely doubtful; but we are indebted to Leuckart for explaining the grounds on which a good second species (*B. cordatus*) may be ranked with the already extended list of human entozoa. In the porpoise, I have discovered a closely allied cestoid (*Diphyllobothrium stemmacephalum*); but the form of the head left me in no doubt as to its specific and generic differentiation.

### 30. BOTHRYOCEPHALUS CORDATUS, Leuckart.

#### *B. cordatus*, Leuckart.

This species is new to science, and has only very recently been described by Leuckart, who received about twenty specimens from the eminent naturalist, Prof. Steenstrup. These examples were obtained at Godhaven, North Greenland, and were transmitted to Steenstrup by the Danish Inspector, Counsellor Olrik. Only one of the worms (about a foot long, or 26 centimetres), came from the human body, all the others being from dogs, in which animal it exists in considerable numbers. It differs from *B. latus* chiefly in the form of the head, which is heart-shaped (or, rather, obcordate), short and broad, and set on to the body without the intervention of a long neck. The segments are distinct from the very commence-

\* This magnificent contribution to entozoology has just come to hand (Jan. 1863); but we have only space to remark that Dr. Knoch finds (contrary to Küchenmeister's statements) six hooks present in the ciliated embryos, as obtains in the non-ciliated proscoteles of *Tænia*. With these embryos he performed a variety of interesting experiments on various animals, and succeeded in rearing, in dogs, not only larval tapeworms, but also sexually mature examples of *Bothryocephalus latus*.—T. S. C.

ment near the head, and so rapidly do they increase in width that the anterior end of the body becomes lancet-shaped. About fifty joints only are immature; and in the longest example (115 centimetres) Leuckart counted a total of 660 joints. It is, however, a smaller species than *B. latus*, and is further distinguished by displaying a greater number of calcareous corpuscles, and more particularly also in the "form of the uterine rosette, which is not only smaller and longer, but likewise exhibits a greater number of lateral processes." Leuckart thinks the *T. vulgaris* of Linnæus and Pallas may be identical with this species. To the naked eye, judging from the figures, *B. cordatus* at first reminds one of Goeze's thick-set *Tania pectinata*; but the structure of the latter is very different\*.

12. ON SOME TIENTSIN BIRDS, COLLECTED BY MR. FLEMING, R.A., IN THE POSSESSION OF MR. WHITELEY. BY ROBERT SWINHOE, ESQ., CORR. MEMB.

A collection of birds, made in the neighbourhood of Tientsin by Mr. Fleming of the Royal Artillery, having come into the possession of Mr. Whiteley, that gentleman has placed them in my hands for inspection and identification. The series comprises only two novelties which have not hitherto been described; but most of the birds are interesting on account of the locality. I will proceed, without further comment, to give a list of them, with what few remarks I may deem necessary.

1. POLIORNIS PYRRHOGENYS, Temm. Faun. Japon.

There are here two skins, in worn plumage, which Mr. Gurney considers the same as the Japanese species.

2. CIRCUS MELANOLEUCUS, Gmelin.

I observed this bird myself near Tientsin. The single specimen in this collection is rather large.

3. FALCO SUBBUTEO, L.

4. FALCO VESPERTINUS, L.

5. ACCIPITER SOLOENSIS, Horsf.

There are two Sparrow-Hawks, one of which, a male, is evidently this species, and agrees well with specimens procured in the South of China. The other is also a male, but apparently different. It is, however, identical with skins in my collection from Canton, Amoy, and Formosa. I should be inclined to consider this *A. gularis*,

\* A few days back (Sept. 19th) I received several fine examples of *T. pectinata* from Canada. They were obligingly forwarded from Kingston by Prof. George Lawson, Ph.D., LL.D., who informs me that they were obtained, in May 1861, from the intestines of a porcupine (*Hystrix dorsata*). This worm was hitherto only known to infest the hare, the rabbit, and the marmot.